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AN
INQUIRY
INTO THE
MEDICAL EFFICACY
OF
A NEW SPECIES
OF
PERUVIAN BARK,
LATELY IMPORTED INTO THIS COUNTRY
UNDER THE NAME OF
YELLOW BARK;
INCLUDING
PRACTICAL OBSERVATIONS
RESPECTING THE CHOICE OF BARK IN GENERAL.

BY
JOHN RELPH, M.D.
Physician to Guy's Hospital.

Et (fateor) volui sub eodem cortice condi.

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1794.



TO
WILLIAM SAUNDERS, M.D.
FELLOW OF THE COLLEGE OF PHYSICIANS,
OF THE
ROYAL SOCIETIES OF LONDON AND EDINBURGH,
AND
SENIOR PHYSICIAN TO GUY'S HOSPITAL.

DEAR SIR,

IT is neither the great eminence which you have justly attained in our profession, nor any ambition of mine, to have this pamphlet honoured with the protection of the author of the admirable “Treatise on the Structure, Economy, and Diseases of the Liver,” that induces me to address this Inquiry to you ; for it is well

known to the public, that by your judicious and successful investigation of the comparative powers of different kinds of Peruvian Bark, you have been able to remove an inveterate prejudice, and render an important service to the practice of medicine. The following sheets therefore, in which the same inquiry is extended to a new species of this medicine, cannot possibly derive more effectual patronage than from you. My wish, however, is not to shield the sentiments I have delivered on the preference of the yellow Peruvian Bark, under the authority of any individual; but

rather to appeal to a decision founded upon the general and impartial experience of the Faculty.

I am,

Dear Sir,

Your obliged and faithful Friend,

JOHN RELPH.

MARK LANE,
July, 16, 1794.

INTRODUCTION.

THE Inquiry here instituted, though capable of being much farther extended, will, I trust, be deemed sufficiently circumstantial, to show, that the yellow Bark, whether considered with a view to its natural history, its chemical analysis, or its practical utility, promises to become a more valuable acquisition to the Materia Medica, than any other species of Peruvian Bark which can now be obtained. The great success with which I employed it, first induced me to give this bark a minute

Pharmaceutical investigation, in conducting of which I availed myself of the friendly assistance of Mr. Babington, teacher of chemistry at Guy's Hospital, who very obligingly conducted all the experiments which were thought necessary. I have also particular acknowledgements to make to my friend Dr. Woodville, by whose assistance I have been enabled to enter very fully into the botanical history of the various species of *Cinchona*.

AN
INQUIRY, &c.

PERUVIAN BARK has been long and deservedly regarded as a medicine of the first estimation in the whole Materia Medica. To obtain a complete analysis of it, and to ascertain its pharmaceutical properties, the Harveian Society of Edinburgh laudably decreed two prize medals. Its consumption in Britain, and her colonial possessions in the East and West Indies, is so very considerable, that to those unacquainted with the quantity annu-

ally imported into this island, it will appear almost incredible; and is a striking proof of the universality of its use. *

Not only in intermittent, but in most fevers, not strictly inflammatory, Bark is the chief medicine on which physicians can with confidence rely. Its utility also in chronic disorders is not less general;

* IMPORTED.

	London.	Out Ports.	Scotland.	Total.
	POUNDS	POUNDS	POUNDS	POUNDS.
1789	166334	1790	14	168038
1790	114113	1171	336	115620
1791	61139	2621	----	63760
1792	175722	----	66	175788
1793	110260	1307	10	111577

EXPORTED.

1789	19870	12	-----	19832
1790	26855 $\frac{1}{4}$	----	252	27121 $\frac{1}{4}$
1791	29618 $\frac{3}{4}$	----	----	29618 $\frac{3}{4}$
1792	22825 $\frac{1}{2}$	20	----	22845 $\frac{1}{2}$
1793	24321 $\frac{1}{2}$	40	----	24361 $\frac{1}{2}$

so that few diseases occur in which, sooner or later, this important remedy is not found necessary, either in the character of a febrifuge or of a tonic. The efficacy therefore of an article so materially interesting to the health of a great part of the community, may be fairly considered as a matter of public concern.

The attention of the legislature has been wisely called forth to obviate the introduction of exotic pestilences into this country; and it will not be deemed of much less importance to point out the medicine best adapted to subdue those that already exist here, and originate with ourselves.

The markets which supply our tables with animal food, are by a well regulated police restrained from vending what is unseasonable and unwholesome; while the qualities of a drug, of the goodness of which we have, as yet, no absolute criterion, and probably upon a single dose of which ⁺ the life of a patient ⁺ may ultimately depend, are left wholly to the discretion of the person whose interest it is to purchase it at the cheapest rate. The price of Peruvian Barks, at this time, varies from eighteen pence to nine shillings the pound, a variation founded upon a supposed comparative difference in their respective goodness: but as this is not regulated by any established principle, but, on the contrary, determined

impossible

by an arbitrary and capricious estimation, it is probable that the scale of its price is far from being accordant with that of its intrinsic value.

Thus the small quilled Bark, of a pale cinnamon colour, was for a series of years generally thought to excel all others; the red Bark therefore, when first brought here, being extremely dissimilar in appearance from the pale, was imagined to be unworthy of the room which it occupied in the warehouses: upon trial, however, the latter was found to be the best, and, while it could be obtained genuine, constantly superseded the small quilled Bark. Nor ought such occurrences to surprize us,

for the trees from which the Peruvian Bark is collected, are now known to be of various species; consequently, it may be inferred, that the species yielding the most efficacious Bark, would not be the first discovered. Hence, when it is found that a quantity of Cinchona Bark is imported, differing manifestly from any other with which we are acquainted, it becomes absolutely necessary that Physicians should ascertain its medicinal powers by adequate experiments, and not, like the druggist, determine its character by its greater or less external resemblance to that which has been judged of the best kind. In order to confirm these observations, and to give the public a competent knowledge of the subject,

whatever relates to the natural history of Cinchona ought to be faithfully stated. This I shall now attempt to do, before I enter upon the consideration of a new species of Peruvian Bark, which I trust will prove a valuable acquisition to the *Materia Medica*.

The extensive provinces, possessed by the Spaniards in South America, have for nearly two centuries supplied Europe with several valuable drugs, of which Cinchona, or, as it has been more commonly called, Peruvian Bark, is the principal. This was first brought to Spain in the year 1632, and its febrifuge power was recognized in that country from an actual trial of its success in 1639; yet the Spanish

physicians were so prejudiced against it, that had its use not been promoted and zealously encouraged by the Jesuits, the utility of this medicine might have been still unestablished. Notwithstanding the patronage which it derived from the powerful influence of that religious society, the opposition to its use soon afterwards became so considerable, that Pope Innocent the Tenth was induced to order an examination to be made into its nature and effects. The favourable result of this examination tended greatly to remove all objections to its safety and efficacy, especially in Italy; though over great part of Europe the Bark was long esteemed of a doubtful character, and its credit in Britain continued in a

fluctuating state till the latter days of Sydenham.

Before the year 1730 no botanical history of the *Quinquina*, or *Arbor febrifuga peruviana*, as the *Cinchona officinalis* was then called, is to be found worthy of attention. The figure of a small branch of it, said by Ray to have been sent by Dr. Goodall to the Royal Society, and the account given by Bollus, a Genoese merchant, who resided several years in Peru, as related by Sebastian Badus, seem to have furnished no satisfactory information. Oliver likewise, in his communication published in the *Philosophical Transactions*, says nothing of it deserving of notice: so that Arrot's "Account of the

Peruvian or Jefuits Bark," read before the Royal Society in 1737, is the first in order of time which appears to claim any confideration.

Mr. Arrot, a furgeon, who was in Peru a few years before Condamine, gives the following relation :

“ The tree from which the Je-
“ fuits Bark is cut, grows in the
“ kingdom of Peru, in the Spanifh
“ Weft Indies, and is found moft
“ commonly in the provinces of
“ Loxa, Ayavaca, and Quenca,
“ which are fituated between two
“ and five degrees of fouth lati-
“ tude. This tree is tall, and has a
“ trunk rather bigger than a man’s
“ thigh, tapering from the root
“ upwards, has no boughs or

“ branches till near its top, which
“ grow as regular as if lopped ar-
“ tificially, and with the leaves
“ form exactly the figure of a he-
“ misphere: its bark is of a black-
“ ish colour on the outside, and
“ sometimes mixt with white spots,
“ whence commonly grows a kind
“ of moss, called by the Spaniards,
“ Barbas: its leaves resemble much
“ the leaves of our plumtree, of
“ a darkish green colour on their
“ upper or concave side, and on
“ their lower or convex side, red-
“ dish: its wood is as hard as our
“ common English ash, and rather
“ tough than brittle.”

“ There are four sorts of the
“ bark of this tree, to which the
“ Spaniards give the following

“ names, viz. cascarilla colorada,
“ or reddish bark ; amarylla, yel-
“ lowish ; crespilla, curling ; and
“ blanca, whitish. But Mr. Arrot
“ could only find two different
“ sorts of the tree, and he believes
“ that the other two sorts of the
“ bark are owing to the different
“ climates where it grows, and not
“ to a different species of the tree.
“ The bark called colorada and
“ amarylla, is the best, and differs
“ from the blanca in this, that the
“ trunk of the former is not nigh
“ so big as that of the latter, the
“ leaves as described above ; where-
“ as those of the blanca are larger,
“ and of a lighter green colour,
“ and its bark has a very thick
“ spongy substance, whitish on the
“ outside, and is so tough, that it

“ requires the force of an axe to
“ slice it from the tree. ’Tis true
“ indeed, it is as bitter when cut
“ down as the best sort, and has
“ then the same effect in intermit-
“ ting fevers ; but when dry and
“ long kept, turns quite insipid
“ and good for nothing. And it
“ is to be observed, that both sorts
“ have a much surer and quicker
“ effect in cures when green, than
“ when dry. As the bad sort is
“ in great plenty, and the best very
“ scarce and hard to be come at,
“ large quantities of it are cut
“ yearly, and sent with a little of
“ the fine bark to Panama, for
“ Europe.”

“ The tree of the crespilla is the
“ same with that of the amarylla

“ and colorada, but grows in a
“ cold frosty climate ; by which
“ means the bark is not only altered
“ in its quality, but is also whitish
“ on the outside, though cinamon-
“ coloured within, and ought in
“ medicines to be rejected. This
“ sort and the blanca grow plenti-
“ fully in the province of Ayavaca,
“ fifty leagues from Piura, and
“ sixty-two from Payta, a port in
“ the South Sea ; as also in Cari-
“ amango, Gonfonama, and Xim-
“ buro ; whence they commonly
“ send it to Payta, and there sell
“ it as the best. The blanca like-
“ wise grows in the province of
“ Quenca, and in the Mountains of
“ Caxamarea ; but the true and
“ genuine fine Jesuits Bark, which
“ is of a reddish or yellowish co-

“lour, is only found from five
“to about fourteen leagues round
“the city of Loxa, in the pro-
“vince of Loxa, called generally
“by the Spaniards, Provincia de las
“Calvas. This city is situated be-
“tween two rivers, that run into
“the great river Marannon, or of
“the Amazons, and lies about an
“hundred leagues from Payta, and
“in a direct line about an hun-
“dred and ten leagues south-east
“from Guayaquil, though by the
“common road near two hundred.
“The places about Loxa, where
“this fine fort is found, are, Sierra
“de Caxanuma, Malacatos, Yruta-
“figna, Yangana, Manfanamace, La
“Sierra de Boqueron, and a place
“called Las Monfas.”

“ The Bark trees do not grow
“ all together in one spot, but
“ intermixt here and there with
“ many others in the woods ; it
“ happens, indeed, sometimes, that
“ clusters of them are found to-
“ gether, though at present they
“ are much scarcer than in former
“ times, a great many of the fine
“ large bark trees having been en-
“ tirely cut down, that their bark
“ might the more easily be sliced
“ off.”

“ The soil where the best sort
“ thrives, is generally in clayey or
“ rocky ground, and very fre-
“ quently on the banks of small
“ rivers descending from high
“ mountains.”

Mr. Arrot is of opinion, “ that
“ a very short time will put
“ an end to this best fort, or,
“ at least, it will be extremely
“ hard to be got, by reason of
“ its distance from any inhabited
“ place, the impenetrability of the
“ woods where it grows, and the
“ scarcity of the Indians to cut it,
“ who, by the Spaniards hard usage
“ and cruelty, are daily diminish-
“ ing so fast, that in a very few
“ years their race in that country
“ will be quite extinct.”

Mr. Arrot says, “ the small bark
“ which curls up like sticks of
“ cinnamon, (and which in Eng-
“ land is much esteemed, as being
“ cut off the branches, and there-
“ fore reckoned better and more

“ effectual in curing fevers) is only
“ the bark of the younger trees,
“ which, as it is very thin, curls
“ in that manner; and that the
“ bark of the branches would not
“ compensate the trouble and ex-
“ penses of cutting.”

This account, which was extracted from the papers of Mr. Arrot, by Mr. Gray, F. R. S. is here transcribed as far as seems applicable to the general purpose of this Inquiry.

Monf. de la Condamine, whose ‘Memoire sur l’Arbre du Quinquina,’ was communicated to the Royal Academy of Sciences at Paris, in 1738, gives the most complete account of the subject

which has hitherto been published, and which comes now under consideration.

He says that, ‘ the best Quinquina, or at least that which is most esteemed, grows on the mountain of Cajanuma, situated about two leagues and a half to the south of Loxa; and that it was from thence the first Peruvian Bark brought to Europe was obtained. And that it is no longer than fifteen years since the dealers in bark, in order to sell it to the best advantage, produced certificates in testimony of its having being bought at Cajanuma.’ Condamine therefore visited this mountain, and passed a night upon its summit, in the house of a man

whose sole business was confined to gathering the Quinquina. In ascending and descending this mountain, Condamine availed himself of the opportunity of examining the trees most esteemed for the goodness of their bark, and from which he took the botanical specimens afterwards delineated and published by the Royal Academy. He says, ‘they commonly distinguish the Quinquina into three sorts, though some reckon four; the white, the yellow, and the red; at Loxa they told me, that the difference of these three kinds is confined to the virtue of the bark, the white having scarcely any, and the red being superior to the yellow. With respect to the trees furnishing these three kinds of bark there is no

essential difference : but my host at Cajanuma, who constantly resides on that mountain to bark the trees, assured me, (and of which I have been since confirmed by those best informed) that the yellow and the red neither manifest any difference in the flower, the leaf, the fruit, nor even in the outer surface of the bark ; in short, that the one is not to be distinguished from the other by external appearance, and that the knife only determines this ; for on cutting the yellow, its bark appears of a less deep colour, and more tender. In regard to the red and the yellow, they grow close to each other, and their barks are collected indiscriminately, although the red is thought to be the better : on drying, their dif-

ference of colour becomes less discernible, and both barks are equally brown on the upper side, which is considered as the most certain criterion of the goodness of the Quinquina, and is what the Spanish express by *envex prieta*. The bark which is rough on the outside, cracked, and brittle, is sold at the highest price.'

'Respecting the white Quinquina, my host at Cajanuma assured me, that its leaves are rounder and rather rough, or less smooth than those of the two others; its flowers are also whitish, its seeds larger, and its outer bark whitish. Its place of growth is usually on the highest mountains, and never in the same places with the yellow

and the red *Quinquina* trees, which commonly grow about half way up the mountains in dells and recesses, and in situations the most sheltered.'

Whether the white *Quinquina* be a variety of the other, occasioned by a difference of soil and the intense cold to which it is exposed, Mr. Condamine had not an opportunity to determine; but he thinks it probable, as the *Quinquina* growing in the hottest situations, is found to possess the most virtue.

'The *Quinquina* tree never grows in the plains, it is straight, and may be distinguished at a distance on every side, by its top being elevated above the neigh-

bouring trees with which it is surrounded ; for it is never found in clumps, but is always scattered among others of a different kind. When unmolested it grows to a large size : some have been found larger than the body of a man, and the smallest are eight or nine inches in diameter. But it rarely happens that any are found of this size on the mountain which furnished the first *Quinquina* : for the trees from which the first bark was taken, and which were very large, are now all dead, in consequence of having been totally stripped of their bark, a process which infallibly kills the old trees, and often proves destructive, though less frequently, to the younger ones.'

‘ It does not appear that the trees growing in the neighbourhood of those which were formerly preferred, but now destroyed, should have Bark of less virtue than the ancient Bark ; for the situation and soil being the same, the difference if it be not accidental, must be entirely owing to the different age of the trees.’

‘ The demand for the Bark has been so great, that at this time scarcely any but young trees are to be found. I have seldom seen any of the trees thicker than my arm, nor higher than from twelve to fifteen feet ; but these, on being cut, send off new shoots from the root.’

‘ They told me at Loxa, that formerly the very thick Bark was preferred, and kept apart as the most valuable ; but at present preference is given to the small Bark. It may be supposed that the Bark merchants found this to their advantage, as being the most convenient for package ; but a Director of the English South Sea Company at Panama, through which all the Quinquina exported into Europe must necessarily pass, assured me, that the preference now given to the twig, or small Bark, is founded on chemical analysis and experiments which were made upon both these barks in England : it is probable that the difficulty of perfectly drying the

thick Bark, and the facility with which it contracts humidity, and which it long retains, may also have contributed to render it of less estimation.'

Mr. Condamine proceeds to say, 'that every day at Cajanuma, near Loxa, and adjoining the same chain of mountains, new Quinquina trees are found; such as those at Ayavaca, thirty leagues south-east of Loxa, where the Quinquina is said to be very good, and of which much has been lately sold. Other trees of this kind have likewise been discovered near Rio Bambo, about four leagues to the north of Loxa, in the neighbourhood of Cuenca. Also on the mountains of Jean, fifty or sixty leagues south-east

of Loxa, and this last Quinquina has been exported into Europe, where it was deemed less efficacious than the other sorts.'

Having now presented the reader with every part of Condamine's account which is capable of throwing any light on the natural history of the Peruvian Bark, it still remains that I should state what Jussieu has written upon this subject, as found in the History of the Royal Society of Medicine at Paris, vol. 3. p. 252.

Dr. Joseph de Jussieu was at Loxa two years after Condamine, where he examined the Quinquina in the character of a botanist as well as in that of a physician.

‘ From the M S. left by him, the generic characters of the Quinquina agree with those mentioned by Condamine; but he notices more species; these however may be reduced to two principal ones, of which the others are perhaps only varieties. The first species comprehends the red Quinquina, the yellow, and the knotty, all of which have very smooth leaves, purplish, and almost inodorous flowers, and bitter Bark, more or less coloured. Of these three, that most esteemed is the red, and was the first in use: it produced its effects so soon, that it justly acquired the celebrity it merited.’

‘ It became so scarce that Jussieu could procure but very little of

it in the neighbourhood of Loxa, where, for this Bark, is necessarily substituted that of the yellow or the knotty, which the Spaniards prefer for their own use, because they are considered to be less active and less heating. Notwithstanding this national prejudice, Jussieu does not hesitate to decide in favour of the red, the virtue of which he tried upon himself. ’

‘ The second species comprehends four varieties of the white Quina, all of which differ from the first species in having large roundish hairy leaves, and very fragrant flowers, beset within, with white hairs ; the capsules also are longer, and the exterior Bark whitish. Two of these have the inner layer

of Bark approaching to red, with little bitterness, and, when fresh, possessing a febrifuge power, which is only of short duration.'

'The Bark of the other two varieties is white, insipid, and without virtue; and their flowers exhale the most sweet odour, by a compensation of nature, which seems to have carried that aroma to the flowers which is refused to the Bark.'

'In this account it is also observed, that the very best Bark loses slowly a part of its efficacy on being long kept; hence it is asked, if we may not conclude, that the active principle of those substances is not volatile, or suscep-

tible of a decomposition more or less rapid. What confirms this opinion, is, that the *Quinquina* at Peru is more efficacious than in Europe; and Jussieu found that an extract made of good recent Bark, had, when brought to Europe, more virtue than a specimen of the same Bark from which it was prepared. This extract retained its efficacy undiminished for thirty years. It is here remarked, that as the red Bark is now only to be obtained in a small quantity, and as the yellow and the knotty, from supplying the great demand of the market, cannot furnish the necessary consumption a long time, it is thought, that unless the *Quinquina* becomes regularly cultivated, or that new forests of it be disco-

vered, Europe must soon lament the want of this valuable medicine.'

Having now reviewed the only original authorities to which all knowledge of the *Quinquina* was long confined, it becomes necessary to examine what further information on the subject, is to be derived from the late rapid extension of every branch of natural history, and more especially that of scientific botany.

A specimen of the *Quinquina* sent to Linnæus, fully enabled him to determine its generic characters, and to assign it to its proper place in his *Systema Vegetabilium*; he found also that in natural affinity, it ranked in the order *Contortæ*.

From the lady of the Count del Cinchon, who first spread its reputation, Linnæus called it *Cinchona*; of which he has only given two species, viz. *Cinchona officinalis*, referred to Condamine, and defined *Cinchona panicula brachiata*, and the *Cinchona caribæa*, or *Cinchona pedunculis unifloris*, first ascertained by Jacquin.

This latter, which is a native of the West Indies, differs so widely from the former, that Linnæus in the 13th edition of his *Systema*, seems to have entertained some doubts if it really belonged to the genus *Cinchona*. The bark taken from the trunk of this tree, is of a plano-convex form, and according to Murray, about a span in

length, and a line and a half in thickness ; two strata of which are very evident, that immediately under the epidermis is yellowish, spongy, insipid, easily rubbed into powder between the fingers and thumb, and is externally rough, and intersected by deep fissures. The inner stratum is compact, fibrous, of a more deep or greenish brown, and of a nauseous sweet, and intensely bitter taste. The bark of the branches is convoluted, and covered with a thin, grey, wrinkled cuticle, beset with lichen leprofus ; all the bark of the branches is more tender, and of a lighter colour. The radish-like and aromatic taste which Dr. Wright discovered, on first putting this bark in his mouth, could not be

perceived by Professor Murray, nor could he find that it possessed any sensible astringency. But all the specimens of it (which he had from Dr. Wright) exhibited on the internal surface, an appearance of *shining minute crystals*.

Murray thinks that the outer stratum ought to be rejected as effete: the inner, when powdered, has the appearance of common Peruvian Bark, but from the experiments of Dr. Skeete, it is much less astringent. In the opinion of Dr. Wright, the Bark of the Caribbean Cinchona is not inferior in efficacy to that of the officinalis.—See a full account and figure of this species in the Philosophical Transactions, vol. 67.

The *Cinchona floribunda* another species, discovered in the West India Islands, especially at St. Lucie, and hence called the St. Lucie Bark Tree, has since the year 1780 become well known.

Mr. Davidson's account of it in the 74th vol. of the Philosophical Transactions, is accompanied with a figure, by which it may be compared with the other species of this genus. It is there characterized *Cinchona floribus paniculatis glabris, laciniis linearibus, tubo longioribus staminibus exsertis; foliis ellipticis glabris.*

The bark of this species is covered with a greyish epidermis, marked with whitish spots, origi-

nating probably from lichens : the inner substance is of a pale brown colour, and of a fibrous and somewhat tough contexture : the pieces are variable in form, but commonly thin, long, and convoluted. Its taste is at first astringent, but this quality is soon overcome by the intense bitterness with which it is succeeded ; this bitterness resembles that of gentian, and is very nauseous : it is without odour, nor does it manifest any upon evaporating the fluids in which the bark is macerated. It gives out nearly all its solubile matter to water, and affords almost a fourth part of its weight, of watery extract. It has been found to be a powerful medicine ; but its nauseous bitterness often renders it emetic, hence few

stomachs can bear it, unless administered in small doses.

Monf. de Galvés, minister at the court of Madrid for the Indian department, received specimens of two species of *Cinchona*, lately discovered near Santa Fé, in South America, accompanied with boxes of their bark in powder.

By order of his Catholic Majesty, Mr. Ortega, professor of botany at Madrid, sent specimens of this bark to the Royal Society of London, and to that of Medicine at Paris, with a view to determine its medicinal utility. Respecting the determination of the former, I know nothing more than what Sir George Baker has said in

the Medical Transactions, viz. “In the month of December, 1778, Mr. Ortega, professor of botany at Madrid, by order of the Spanish ministry, sent hither two varieties of the Quinquina, very different in appearance from that with which we had been acquainted; it was, however certified, that they were species of Quinquina; and they were said to have been brought from the kingdom of Santa Fé. Our Royal Society being consulted, appointed a committee to inquire whether or no they were likely to answer the purposes of the true Bark. Upon trial they were found far inferior. Towards the end of the year 1779, or the beginning of the year 1780, considerable quantities of both these species were

found mixed with the common Bark ; and likewise a great deal of a certain spurious Bark, in colour not unlike the true, but smother externally, and internally remarkable for its longitudinal fibres. I do not know that any experiments have been made with this drug, or that it is a Quinquina ; but from its taste and appearance it would seem of much less value than the common.”

The two species sent to the Royal Society of Medicine at Paris, were also referred to a committee of that body, who reported, ‘that the botanical specimens, though well preserved, were incomplete. They could, however, from inspection, determine their specific

characters. The leaves of the first were oval, smooth, marked with reddish nerves, and resembled in every respect those of the red *Quinquina*, which Condamine sent from Peru, and which *Monf. de Jussieu* preserves in his *Herbarium*; and the same resemblance is also observable in the fruit. Therefore without seeing the flowers, or the Bark, we are enabled to say, that it is a good species, and we are led to believe that it is the true red *Quinquina* which has become so scarce at Loxa.'

‘The second specimen, of which the leaves are very large, roundish, and hairy, and the flowers beset on the inside with hairs, is known by these circumstances to be the

white Quinquina, or a bad kind ; besides, the capsules are elongated and approach to those of that species which *Monf. de Jussieu* says is absolutely without virtue. The bark of the first species is of a pale yellow, sensibly aromatic, moderately bitter, and very astringent. That of the second is of a deeper yellow, approaching to the colour of turmeric, with little odour, great bitterness, and scarcely any astringency. Chemical analysis of these Barks confirmed the opinion entertained of them by botanical observation ; for four ounces of the first species of Bark afforded an ounce of watery extract ; while from the same quantity of the latter, only five drams were obtained.’

Murray informs us, that specimens of these two were sent to the Linnean Herbarium, and also to that of Sir Joseph Banks, one of which (*a*) was called *C. Peruviana*, because found by Louis Née, at Loya, in the kingdom of Peru; the other (*b*) *C. Bogetensis*, was found the same year in the country of Santa Fé, in Carthagená.

The *Cinchona angustifolia*, floribus paniculatis glabris, capsulis oblongis pentagonis, foliis lineari-lanceolatis pubescentibus, is a small species of *Cinchona*, first described by Swartz, and found growing on the banks of rivers in St. Domingo. The bark, upon the lower part of its trunk, is, thick, rough, cracked, and externally greyish, or of a dark

colour ; its internal surface is clammy ; this viscosity is also observable in the bark of the upper part and of the branches, though in a less degree. Its taste is intensely bitter, accompanied with a somewhat sweetish and aromatic flavour. Watery and spirituous infusions of this Bark, are of a deeper colour than those of the common Bark, and become black by the addition of a solution of iron. Other experiments made by Swartz shew, that this Bark is nearly allied to the common Cortex Peruvianus.

The *Cinchona corymbifera*, described in the Supp. Plantarum, was discovered more than twenty years ago by Forster, in several islands in the South Sea. Its cha-

rafter is *C. foliis oblongo-lanceolatis, corymbis axillaribus*. The Bark of this species, according to Forster, is very bitter, moderately astringent, and nearly resembles the Peruvian Bark ; but Murray thinks that it more closely accords with the Santa Fé species, (*a*) or *C. bogotensis*: it is of the convoluted form, though Barks of various species have been sold for that of the *C. corymbifera*.

Professor Vahl, in the Transactions of the Natural History Society at Copenhagen, has arranged all the species of *Cinchona*, of which proper specimens could be procured, into botanical order ; and of four of these he has given figures. His first division comprehends all

those of which the flowers are hairy, and the stamina are concealed within the tube of the corolla, including

1st. *Cinchona officinalis*, or *C. foliis ovatis lanceolatis glabris, capsulis oblongis*.

2. *C. pubescens*,

C. foliis ovatis basi elongatis subtus pubescentibus, capsulis cylindricis.

3. *C. macrocarpa*,

C. foliis oblongis subtus pubescentibus costatis.

Having a smooth corolla and stamina longer than the tube.

4. *C. caribaea*,

C. pedunculis axillaribus unifloris.

5. *C. corymbifera*,

C. foliis oblongo-lanceolatis, corymbis axillaribus.

6. C. lineata,

C. panicula terminali, foliis ovatis acuminatis glabris, capsulis pentagonis.

7. C. floribunda,

C. panicula terminali, capsulis turbinatis levibus, foliis ellipticis acuminatis.

8. C. brachycarpa,

C. panicula terminali, capsulis obovatis costatis, foliis ellipticis obtusis.

9. C. angustifolia,

C. panicula terminali, capsulis oblongis pentagonis, foliis lineari-lanceolatis pubescentibus.

The *first* is said to be a native of Loxa, and is described from a

specimen in the Herbarium of Jussieu. Vahl refers it to the *Quinquina* figured by Condamine, and to the *C. officinalis* of the 10th edition of the *Syst. Veget.* or *C. panicula brachiata*, in the *Species plantarum*. But on comparing the figure of it, as given by Vahl, with the original specimen preserved in the Linnean Herbarium, a considerable difference is observed. It is therefore probable, that the Barks of both species have been indiscriminately imported into Europe for medical use.

The *second* was likewise obtained from Jussieu, who has stated it to be of the Peruvian species. We find no synonyma of it subjoined, but Vahl supposes it to be the *Quin-*

quina blanc of Condamine, and our inquiries have convinced us that he is right; and as synonyma of this, we may refer to the *Cascarilla blanca* of Arrot, and to the second species noticed in the report of the Royal Academy of Medicine at Paris, (*b. C. Bogetenfis*) said to be brought from Santa Fé; the bark of which is stated to be of a deep yellow colour, approaching to that of turmeric, with little odour, great bitterness, scarcely any astringency, and affording little extract.

The *third* species which was brought from Santa Fé, and given to Vahl by Mr. Ortega, is referred to the *Cinchona* of Mutis, and described as the *officinalis* by Linné,

in his 12th edition of the Syft. Veget. and ftill retained in the Supp. Plant. and in Murray's Syft. Veget. Vahl obferves that Mutis could not fend the officinal fpecies to Europe, as he never was at Peru, the only country which is known to produce it ; befides, the Linnean defcription here alluded to, neither agrees with the character nor the figure of the Cinchona given by Condamine.

This appears to be the firft fpecies mentioned in the report made by the Parifian Academicians, and that marked (a) *C. peruviana*, in the Herbaria of Sir Jofeph Banks and Dr. Smith. On the testimony of the French Academy, it yields a fourth part of its weight

of extract, and is in every respect equal to the best officinal Bark, agreeing nearly to the character of the red Bark.

Murray describes the Bark, from his own specimens, to be in long, flattish, smooth pieces, about a line and a half in thickness; its cuticle is white and warty; the bark is of a brownish yellow, fibrous, and much less bitter than any of the other Peruvian species of *Cinchona*: for though sent from Santa Fé, it was found by Louis Née at Loya, in the kingdom of Peru.

Vahl says, that a few years ago, a considerable quantity of it was imported into Madrid, and continued in great estimation with the

physicians there. However, both the bark of this species and that of the *pubescens*, on being tried in this country, were found, according to the report of Sir George Baker, inferior to common Peruvian Bark, as has been already stated at page 40.

The fourth, seventh, and ninth species, we have already fully noticed, under the same names as here adopted by Vahl.

The fifth species, found by Forster in the South Sea Islands, the sixth, a native of St. Domingo, and the eighth, a native of Jamaica, all seem to afford bark possessing a certain share of medicinal power; but to what extent, experi-

ments have not as yet enabled us to give any satisfactory account.

In addition to the species here enumerated, some others might be adduced, but as little is known of their botanical history, or medical effect, it would answer no useful purpose to enter upon their description. The species of *Cinchona* figured by my ingenious friend Dr. Woodville, in his Medical Botany, as the supposed parent of red Peruvian Bark, rests on the authorities of Combe and Groschke, and is suggested merely as matter of probability.

Upon reviewing all these accounts on the interesting genus of *Cinchona*, it must appear a task of

the utmost difficulty, to refer the different Peruvian Barks now medically employed, to one or other of the species above-mentioned. Even the true officinal species of *Cinchona*, seems not yet precisely determined; and the lubricious or variable tendency of this genus (which the preceding information implies) may have been one cause of this obscurity. Had a botanical specimen of this tree always accompanied the importation of every different kind of bark, much might have been done; but unfortunately we have no botanical knowledge of some species, whose bark is justly in the greatest estimation; and on the contrary we are unacquainted with the bark of others, the bo-

tanical characters of which are well ascertained.

From Condamine's account it appears, that those trees which he calls the best species of *Cinchona*, constantly affect situations at about an equal distance between the base and summit of mountains, and especially where they form such recesses or hollows as are screened from the cold winds. Hence he concludes, that the best bark is collected from trees growing in the hottest places : but as these remarks were only applied to the mountains of *Cajanuma*, which are situated between two and five degrees of south latitude, it is probable that the same species, destined

to grow at a greater distance from the equator, would require a less elevated ground, where they would still enjoy an equal degree of heat. Accordingly, it is found, that the *Cinchona* grows in very different parallels of latitude, both to the north and south; nor do mountainous situations seem to give any determinate character to its bark. For in the history of the Peruvian species before given, it is positively asserted, that the *Cinchona* trees manifestly of the same species, and growing near to each other, produce barks which are widely different, and that this is the case with respect to the red and yellow Bark, which are not to be distinguished while growing, till cut by the knife.

It is therefore to be presumed, that the growth of the best bark is not to be circumscribed to any limited district; and indeed it has proved so in fact, for it appears upon unquestionable authorities, that little or none of the Loxa Bark has been imported here for sale, during the last forty years, though since that time we have had bark equally efficacious, or superior to the old bark first in use; consequently we have a well-founded hope, that the vast and unexplored forests of South America, will continue from century to century, to open new sources of this invaluable medicine: nor can it be deemed too presumptuous to suppose, that some species of *Cinchona* may yet be discovered,

of more advantage to medicine, than any which has hitherto been employed.

I have been led to this consideration from lately using a species of Peruvian Bark, which, till within the course of last year, has been unknown in this country, and which promises, by the trials made with it, to surpass in efficacy, all the others now used for the purposes of medicine.

This is now known in London by the name of Yellow Bark ; but from the description of it which follows, it will appear to be different from the yellow kind noticed by Arrot and Condamine, or indeed of any other author except

Murray, who has described a “Cortex Chinæ, vel Chinchinæ Regius, feu Cortex Chinæ Flavus,” with which it seems to agree, both in its external and medical characters. Of this Royal Yellow Quinquina, professor Murray gives the following account. (Vide Murray Appar. Medicam. vol. 6.)

“ This Bark not long ago was brought from London under the foregoing name. Of what country it is a native I know not. But in the month of June, 1790, when I was at Frankfort on the Main, I saw specimens of it with Mr. Salzwedel an experienced apothecary, who favoured me with one of them. I saw it afterwards in an apothecary’s shop at Wisbad. It

bore then a high price, a pound of it being sold for sixteen dollars by Messrs. Ettlings druggists at Frankfort. This bark consists of flattish pieces, of about the length of a finger, the breadth of the thumb, and a line in thickness. Its colour is yellowish, inclining to that of the rust of iron. It partakes more of the ferruginous colour on its external, than on its internal surface, owing to the close adhesion of the epidermis to the bark. Both in its fracture and on the surface, it appears fibrillous, breaking so easily between the fingers, that it may be rubbed into a yellow powder. Its taste is intensely bitter, with a slight degree of astringency. Its efficacy, by certain of the Frankfort physicians,

is considered, as very far superior in intermittant fevers, to the bark commonly employed. I have no doubt of this bark being the same with that lately sent me by the celebrated L. B. Ab Afch, under the name of the Cortex Chinæ Flavus, though it seemed to me somewhat more ponderous and compact, but resembling it in appearance, and not inferior to it in bitterness. It will be the means of avoiding confusion, if, in future, this bark should be denominated the Royal Yellow Bark ; for lately at Amsterdam, some bark was sold under that appellation, for fourteen florins a pound, which, from the specimens I have seen, appeared to me, to resemble in every respect, the red Peruvian Bark, but of a somewhat

paler red. Dr. Thueffink, in a letter to Professor Blumenbach, (dated the 25th August, 1790) has said, that it is called Royal Bark, because it was intended for the use of the Royal Family of Spain; and he was satisfied from his own experience, that, it very far excelled the common Peruvian Bark in efficacy. Its colour is not properly yellow, but more nearly resembles that of the rust of iron.

Monf. Condamine, and Joseph de Jussieu, have made mention of a bark found in the kingdom of Peru, of a yellow colour; and Mr. Arrot has noticed a yellowish bark; but we cannot from their descriptions find out characters which agree with those above."

I have here related the whole of what Murray has said respecting this bark, in order that it may be the more fully compared with the yellow Bark, which is the subject of this treatise, and which I shall describe as follows :

This Bark, though denominated yellow, is only to be understood, as approaching nearer to that colour, than any other species of Peruvian Bark, imported into this country, especially when reduced to powder. It consists of flattish irregular pieces, of a cinnamon colour, inclining to red, and having in certain directions of the light, a peculiar sparkling appearance on the surface. They are very generally divested of the cuticle,

of a fibrous texture, dry, and rigid to the feel, and easily rubbed into powder between the fingers and thumb; neither remarkably weighty nor the contrary. They have little odour, but to the taste manifest intense bitterness, with a moderate share of astringency, together with a certain flavour corresponding unequivocally to those of the *Cinchona officinalis*. The external surface of this bark, is of a somewhat deeper colour than that of the internal, and in some specimens it is as deep as that of the red Bark. The pieces vary much in size; some are about two inches and a half in length, an inch in breadth, and the sixth of an inch in thickness; while others are still smaller, and some are to be found from

twelve to eighteen inches in length, with the breadth and thickness in proportion. I have also seen whole chests of this bark, the pieces of which were nearly cylindrical, and as completely covered with outer coat, as the most perfect specimens of common Bark. The epidermis of the large pieces of the yellow Bark, is of a reddish brown colour, rough, and of a somewhat spongy texture; but that of the smaller pieces is of a grey colour, harder, and much more compact.

On comparing this description of the yellow Bark with that given by professor Murray, of the *Cortex Chinæ*, their similitude becomes sufficiently obvious to determine me to conclude, that they are of the

same species. Their external resemblance, and the qualities they manifest to the organs of taste, tend mutually to confirm this opinion; though, from not possessing any specimens of the Cortex Chinæ, it is impossible that the identity of these barks can be absolutely ascertained.

Another proof, that this yellow Peruvian Bark, is the same with that which professor Murray describes under the name of Cortex Chinæ Flavus, appears from letters received here from different Spanish merchants at Cadiz, in one of which, dated September, 1789, it is observed, “ The yellow Bark, which has only been lately known, is infinitely superior to all the other

barks, by its activity and admirable properties. Fevers which have resisted red Bark, give way to this very easily. The first parcel which arrived here, was tried at Madrid, and was immediately bought by the King's order for his own use. We also found means to procure a few hundred pounds of it, in order to make experiments here as well as in France, and had every where the greatest success."

Here we find a perfect coincidence with Murray's account, which states that this bark on being discovered to be more efficacious than the other species, was reserved for the use of the Royal Family of Spain, and hence he distinguished it by the name of *Royal Yellow Bark*.

In what part of Spanish America the species of *Cinchona* producing the yellow Bark grows, we have no satisfactory information ; all that is known by the drug merchants at Cadiz, is contained in the following letter : “ The yellow Bark was not conveyed to Lima by sea, like the other kinds of bark, but was found only at the distance of two or three hundred leagues from the capital, and was obliged to be brought over steep, and almost inaccessible mountains, a circumstance which will prevent the reduction of the price, and make it come at 6 and 6 5-8 rials of 16 quarts, at Lima. These particulars have been confirmed to us by many people, who have inhabited those parts, so that we fear not to give you them

as true. The repute which this bark had got, was likely to bring a great quantity ; we were the first that bought any, and we paid three pistoreens, but it having been sold in France for two louis d'ors, it rose here to six and seven pistoreens ; we afterwards bought some at twenty-four and twenty rials. The profit that this advantageous price offered, tempted the inhabitants of Lima to try every effort to procure some and send it here. But from the calm which has reigned since in this article, and the losses sustained by the present sales, it may be depended on, that no new expedition will be effected, and that they cannot easily be renewed. There must not only be great preparations, but also a long interval of time to

procure this bark at the distance it is found from Lima.”

On the authority of this letter, which I received from a person of unquestionable integrity, it is evident, that the yellow Peruvian Bark tree grows in the interior parts of Spanish America, in a mountainous country, and at such a great distance from Lima, that the expence of conveying it thither must be very considerable; consequently the merchant cannot obtain it, but at a higher price than that of the other species of Cinchona, which are found much nearer the capital of Peru: and hence the yellow Bark has been sold at a much dearer rate than the other barks, which fully

certifies the great reputation it sustains at Peru.

It is well known to druggists, that the most valuable bark is brought to Europe in what are called half chests, and the yellow Bark has not only this presumptive indication of its goodness, but its epidermis, or external coat, is stripped off, evidently at the expence of much manual labour ; so that nothing but the efficient part of the bark, or the real liber, remains ; for whatever may be thought of the outer coat of the bark, experiments prove it to be an inert substance, and totally void of medicinal power ; therefore in the small quilled Bark, in which the quantity of

this uselefs external matter bears fo confiderable a proportion to the true liber, an adulteration muft neceffarily take place on powdering it, and thereby the neceffary dofe will be rendered more bulky and lefs efficacious. In this obfervation I include not only the proper epidermis, and the lichens with which it may be covered, but alfo the exterior part of the liber itfelf, which, in the older bark, becomes black and effete to a confiderable extent. The large yellow Bark, therefore, from being freed of all this extraneous part, poffeffes the advantage of being compofed of a larger proportion of active and foluble matter.

From the accounts of Arrot,

Condamine, and Jussieu, it is manifest, that the goodness of the different species of Peruvian Bark, was found to be always in proportion to the deepness of its colour : thus the red was most valued, and the virtues of the white, pale, and yellow, yielded successively to each other. But admitting this observation to its utmost extent, the yellow Bark should now be preferred to any other which has lately been imported into Europe ; for the true red Bark so fully described and recommended by my learned friend Dr. Saunders, has all been consumed some time ago, and notwithstanding the increased demand for this species, the drug merchants found it impossible to procure of it a second importation of

the same quality; and though much bark is still sold under this name, yet, upon examination, it is found evidently inferior to the original red Bark. Besides, the Bark to which I here call the attention of medical practitioners, though named yellow, is in reality of a deep or dull orange colour; approaching nearly to the rust of iron, and on being a few days exposed to the light, acquires a still darker colour than the red Bark; therefore, so far as colour may be deemed a test of comparative superiority in the goodness of the Peruvian Bark, this species has still a claim to superior excellence.

Another objection which may possibly be offered to the yellow

Bark, is, its want of odour, or what has been termed aroma. In reply to this, I am happily enabled to do away a prejudice which has long prevailed on this subject. Authors have generally expressed the smell of the Cinchona Bark by the word musty, and the term is perfectly appropriate. With a view to investigate the seat of this principle of odour in different specimens of common bark, I had recourse to experiments, from which I soon perceived that those pieces most beset with lichens, and invested with a blackish epidermis, gave out the most of this musty smell. This I was led to expect, from a conversation which I had with the President of the Linnean Society, in which he suggested, that the

smell of the Peruvian Bark might probably reside in its extraneous covering, the truth of which has since been confirmed by experiments. For, upon carefully separating the external matter from the liber, the latter was completely devoid of smell; consequently the yellow Bark, when divested of its outer coat, is also with this divested of its odour; and in small quilled yellow Bark (of which I have seen some chests) covered with its epidermis, the smell is nearly the same as in the other quilled sort.

The great thickness to which the principal part of the yellow Bark extends, must, as in the red Bark, be considered as a proof of

its greater perfection, especially when separated from the outer effete, and decayed matter.

The Bark of the large part of trees, in which the process of vegetation is more perfect, not only consists of a greater number of layers, but these are constituted of more efficient matter. Thus, according to Seba, the bark of the cinnamon tree does not acquire its full flavour till it be of seven years growth ; and it is well known to tanners, that the bark taken from the trunk of the oak, is more efficacious than that taken from the small branches ; therefore unless in the Cinchona, this general principle and order of nature were inverted, a preference ought certainly

to be given to the thicker and more fully formed bark. It is true, that on examining a chest of Peruvian Bark, pieces vary much in all their dimensions, and even different species of Bark are intermixed in the same chest, but the name of that species which is most abundant attaches to the whole chest.

The preceding observations on the colour, odour, and size of Peruvian Bark, will, it is presumed, have some influence with the medical practitioner, though, perhaps, not sufficient, to overturn long established opinions; for, as in former times, Lister preferred the thick, and Morton the small Bark, so at this day, a diversity of opinion on this point does and will prevail.

However, as enough has been said concerning the external characters of this bark, to shew that none of them render it incompatible with those of the best Peruvian species ; I shall now proceed upon the experimental part of this inquiry, to which the cautious reader will naturally look for still more decisive and unequivocal proofs of the efficacy of the yellow Peruvian Bark,

The results of the various chemical tests to which the yellow Bark was comparatively put, with those of the best red and quilled Bark, clearly demonstrate, that the powers of the two latter species were uniformly surpassed by those of the former throughout all the different

trials which it was thought necessary to institute.

These experiments were projected and entirely conducted by my esteemed friend Mr. Babington, a circumstance from which I derive great satisfaction, as he is a man whose scientific knowledge of chemistry is generally acknowledged, and of whose accuracy and fidelity no doubts can arise ; I shall therefore relate the experiments in his own words.

“ In this communication you have a short but faithful detail of such observations, and the results of such experiments, as I have already made on the yellow Peruvian Bark ; and as all that I have hitherto done

has been conducted on a large scale, and under the daily inspection of many gentlemen, as well as yourself, no otherwise interested on this occasion than in the gratification of professional curiosity, I hope, so far as my inquiries have extended they will be found satisfactory. If, in your intended publication, you can make the following experiments in any degree subservient to your own use, or the general advantage of society, I shall think myself fully recompensed for all the time and trouble they have cost me.”

Of the Decoction of the Yellow Bark.

“The decoction of this, like that of the common Bark, is, whilst

hot, transparent, and of a brownish colour. Upon cooling, it becomes turbid, and changes to a yellow. If it be made in the same proportion with the decoctum Cinchonæ of the London Pharmacopœia, it is difficult by the eye, to distinguish the one, from the other : but on a more particular examination they are found to differ very widely. The decoction of common Bark, as every one knows, is both bitter and astringent ; has a particular flavour, which many have thought fit to express by the term aromatic ; keeps for several days in a moderate temperature, without undergoing any material alteration ; and, upon the application of iron in any of its soluble forms, it becomes additionally turbid, and

yields a dark precipitate. In all these respects, except with regard to flavour, the decoction of yellow Bark is decidedly superior, not only to the common, but even to that of the foundest and most genuine red Bark. I have diluted the decoction of yellow Bark with twice its quantity of water, and found it fully as bitter as the decoction of the best common bark made at the same time, and exactly under similar circumstances; whilst, on another occasion, comparing the bitterness of the decoction of yellow, with that of red Bark, the former appeared greater than the latter, in the proportion of two to one. The difference is equally remarkable in the astringency of these decoctions, the yellow, the common, and the

red ; to equal quantities of which, if a solution of vitriolated iron be added, till no further decomposition ensue, there will be produced in the first, a darker and much more copious precipitation than in either of the other two ; and when a pint of each was taken and set by in common quart bottles, which was done in the month of December, and these afterwards from time to time examined with regard to their soundness, it was found, that the mouldiness and acidity observable in the common, in three, and in the red, at the end of six weeks, had not taken place in the yellow for nearly two months.”

“This new species of Bark appears to me to have little smell ;

in decoction also it is less odorous than in that of all the other kinds of bark with which, in the course of examination I have hitherto had occasion to contrast it. But before we draw an unfavourable conclusion from the deficiency of this quality, upon which many are disposed to lay particular stress, it will be necessary first, to ascertain in what parts of the Bark this property resides."

"For my own part, I am disposed to believe, as first ingeniously suggested by the learned Dr. Smith, that the odour of Bark is more independent of its active parts than is commonly imagined; that is to say, that it belongs not so much to the internal, substantial, and effica-

cious strata of the subject, as to the mossy vegetations which grow upon the surface, and which, together with the old epidermis, constitute its natural covering. For I find, that when this is carefully separated by rasping, or any other mechanical means, this property is materially lessened."

"Bark, when covered with its epidermis, and distilled with water, yields a colourless liquor, manifestly possessing the flavour of its cuticle; but if it be previously divested of this external covering, this flavour is certainly much less observable. Hence we come at a very satisfactory explanation of the variety in different kinds of Cinchona, with regard to this sensible

property ; and more especially why the *Cinchona flava*, naked as it usually is, should possess so slight a degree of odour.”

“ The decoction of common Bark appeared to Dr. Percival to be an injudicious preparation ; “for though, (says he) the cortex is not a substance of much volatility, yet there is a certain aroma accompanying it, which the heat of boiling water cannot fail to dissipate, and consequently the medicine is deprived of one of its component parts, in which, probably, some share of its virtue resides.”

“ Dr. Skeete, in his experiments and observations on Peruvian Bark, commences the experimental part

of his treatise with an inquiry into the volatility of the subject, and thought it particularly necessary so to do, “since most writers laid great stress on the supposed aroma, and condemned certain forms of the bark from the idea, that it was dissipated during their preparation.” The conclusion is, “that the slight smell of the condensed liquor, in the distillation of bark, arose from a few of the finer resinous particles which are raised by the heat, and are more numerous in proportion as it is more quickly applied.”

“It is obvious therefore, that neither of these physicians, nor indeed any other I am acquainted with, had the least suspicion of the presence of the mossy impregnation

I am speaking of. On this head I have only further to add, that, independent of the cortical or mossy flavour, I do not find that a decoction of Bark in general is so easily decomposed in boiling, as, from the opinion of medical authors, I was at one time disposed to believe. To be the more satisfied of this, I have kept measured quantities of different kinds of decoctions under brisk and constant ebullition, for upwards of ten hours, but have never observed any material diminution either in their bitterness or astringency. This leads me to conclude, that those who have asserted the contrary, were deceived, and had inferred a change in those properties, from a dissipation of the odour, or what is more probable,

had employed metallic vessels which had been acted upon during the operation.”

*Of the Infusion of Yellow Bark in
hot and in cold Water.*

“When the powder of this bark has been macerated in boiling water, in the usual proportions, and for the usual length of time, it communicates to it, as other barks do, the properties of a weak decoction. The infusion if filtered, whilst hot, is of a light brown colour, transparent, bitter, and astringent; upon cooling, it changes colour, and becomes turbid, and by the addition of vitriolated iron, undergoes the same alteration as the decoction, though obviously in a less degree.

If, instead of being macerated in hot water, the powder be either triturated with cold water, in the manner particularly spoken of by Dr. Percival, or infused in it in the common way, for the space of twenty-four hours, the liquor receives a very strong impregnation, not so much from the astringency, as from the pure and intense bitterness of the subject."

"Two circumstances, in the pharmaceutic history of this article, which have in a particular manner engaged my attention, are, the predominancy of its bitterness when compared with other barks, and the determined fixity with which it seems attached. These are such, that it appears to me doubtful

whether it is possible by an aqueous menstruum to extract all its bitterness without the assistance of heat. For, being desirous of seeing how far an extract of the cold infusion of yellow Bark would resemble the foreign Peruvian extract, lately held in great estimation, I took for this purpose five pounds of the finest powder, and at the end of eleven days, when I had used above one hundred gallons of water, I found the powder was so far from being insipid, that it was still as bitter as the common powdered bark of the shops. The water in which the bark had been infused, on being filtered, and evaporated by the heat of a water bath, yielded fifteen ounces of extract, of a dark brown colour, and pillular consist-

ence ; extremley bitter, and possessing a certain degree of transparency.”

“Of the experiments comprehended under the head of infusion, I conceived it of consequence to attend to the effects of magnesia, which, on common and red Barks have been found so materially different. We are informed by Dr. Skeete, and the fact is universally admitted, that when magnesia, whether pure or aërated, is triturated with the powder of common bark, and water gradually added, so as to reduce the mixture first into a paste, and afterwards to render it fluid, the infusion passed through filtering paper, is of a much deeper colour, more bitter

and astringent to the taste, produces a more copious precipitation on the addition of vitriolated iron, is of greater specific gravity, and much more powerfully antiseptic, than an infusion of the same bark, made with the water only. But if the powder of red Bark be submitted to a similar treatment, neither common nor calcined magnesia is observed to occasion any alteration. This difference in the action of this earthy substance upon common and red Bark, would seem, as the Dr. observes, to point out a difference in the nature of their constituent parts, which we are not capable of detecting by means of other experiments. The infusion of yellow Bark with magnesia, has properties peculiar to

itself. If two parts of yellow Bark in fine powder, be mixed with one part of pure, or an equal quantity of aërated magnesia, and made into an infusion, by the gradual addition of sixteen parts of pure water; the liquor, when filtered, though somewhat deeper in colour, will not be found in taste either so bitter or astringent, as if no magnesia had been used; and yet when equal quantities of the simple and magnesian infusions are examined by means of a chalybeate solution, in the first, the change of colour is slow, in the other an immediate blackness, as well as a more copious deposition take place. From which I think it is obvious, that whatever be the nature of the bitterness and astringency of bark, con-

sidered as separate principles, they vary in different species, not only with regard to their proportions, but also in their mode of combination. The effects of magnesia, in the present instance, I consider as analagous to those which Mr. Scheele has stated, to be produced by lime upon benzoin; in which case, a union takes place between the calcareous earth and the vegetable saline part, commonly called the flowers of benzoin; so here, the astringent and bitter principles of the bark are chemically combined with the magnesia; occasioning a concealment of their properties, which, on subsequent decomposition, may be recovered unimpaired. Even in the same species of bark I

conceive it very possible, that the sapid principles may differ essentially as to their mode of existence, more especially with respect to astringency. In a substance so compounded it seems not unreasonable to suppose, that the principle of astringency, may be either united with some other constituent part, and thereby become chemically altered; or that it may exist in a separate form, loose and unrestrained, ready therefore on all occasions to exert its particular effects: or lastly, like the phosphoric acid in urine, it may be partly in a state of combination and partly loose, as would appear to be the case in those experiments, where, after rendering bark completely insipid

by one menstruum, we can extract additional astringency by another.

It depends probably, more upon the peculiar effects of heat, than upon a disproportion in the strength of the preparations, that the infusions of every kind of bark become so much sooner mouldy than their respective decoctions. The cold infusion of common bark can seldom be preserved for more than two or three days, without undergoing this change ; and in that of the red and yellow it is generally observable in the space of a week ; this differs very widely from what has been already stated, with regard to their respective decoctions. We have many examples of the

influence of a boiling heat in the preservation of vegetable liquors ; none perhaps are more remarkable than in the case of vinegar, which we are told by Mr. Scheele, may be kept for any length of time, by putting it into common bottles and heating it in a water bath.

*Of the Tincture of Yellow Bark,
in Proof and Rectified Spirit of
Wine.*

In the preparation of the simple tincture of common bark, the College of Physicians directs, that six ounces of this substance in powder, should be digested with a gentle heat for eight days, in

a quart of proof spirit. The powder of yellow Bark employed in this way, produces a tincture in colour and transparency differing very little from the above, but so far surpassing it in bitterness and astringency, that the smallest portion of each is sufficient for their immediate distinction; equally easy is it to decide that, notwithstanding the richness of colour, it surpasses even the tincture of red Bark, in both the foregoing properties.

Having taken particular pains in the preparation of these different tinctures, I was not a little surprised to find, on examining their specific gravity; not that the tincture of yellow Bark was

heavier than that of common Bark, for this I naturally expected; but that the tincture of red Bark should be lighter than either of the others. Their proportions were the following:

Tincture of yellow Bark,	918
———— common Bark,	912
———— red Bark,	911½

In correspondence with these results, upon evaporating a pint of each of these tinctures in a water bath, the first yielded 311, the second, 210, and the third, only 201 grains of solid residuum. It would appear, therefore, I think, highly probable, that the red Bark now in use, and of which I had provided the soundest and

most perfect specimens, is not, in point of strength or product, equal to what it originally was. For, according to Dr. Skeete's experiments, which were made when the first importation of this article was in general circulation, a phial, containing about two ounces by measure, of the tincture of this in proof spirit, weighed two grains more than a tincture of common bark in the same spirit, made for the purpose of comparison. The tincture of yellow Bark in rectified spirit, differs chiefly from that in proof, by being of a lighter colour, and more intensely bitter to the taste. It has very nearly the same shade as a tincture of common Bark in rectified spirit. In alcohol the co-

lour is lighter, with purer bitterness, but a much less degree of astringency. When a certain quantity of bark in powder, has been digested in repeated portions of pure spirit, it becomes completely insipid, and loses nearly one third of its quantity; but, notwithstanding, that neither to the smell nor taste is there the smallest flavour, bitterness or astringency discernible; yet upon making a decoction of the residuum in water, the filtered liquor changes colour, and becomes immediately turbid upon the addition of a chalybeate solution. This is one of the examples alluded to, in hinting at the possibility, that astringency might be such a principle as in the same

subject admitted of different modes of existence. Having had occasion to attend particularly to the menstrual power of spirit, in contrasting the tinctures of yellow Bark with those of the common and red, I could not help being surpris'd, that Dr. Lewis should have been contradicted in his assertion, that proof-spirit extracts less from bark than rectified spirit, but more than water. The solvent power of the former, is stated by Dr. Skeete, to be inferior to the latter in the proportion of at least three to one. When yellow Bark, in substance, is submitted to distillation with water, the flavour of the subject may be said to be barely distinguishable, but in the distillation of its tinctures, there

arises not the slightest impregnation."

"Dr. Lewis was of opinion, that the astringency of bark resided wholly in its resin; its bitterness in a gummy resinous substance, soluble both in water and spirit. Dr. Skeete believed, that both the bitterness and astringency belonged to the resin only, and that the mucilage or gummy part was of a similar nature with that of common gum arabic. The reason of mentioning these opinions is, that they have led to an experiment by Dr. Skeete, about which I have never been satisfied."

"The Doctor states, that having taken three ounces of tincture of

bark, partly prepared with proof, and partly with rectified spirit, he added to them six ounces of water, and decanted off the clear liquor as soon as the resin had subsided. Successive quantities of water were then employed in a similar manner, till they ceased to dissolve any portion whatever of the bark, being thoroughly void of taste, as well as colour. The pure resin was now mixed with about twenty grains of gum arabic, and having added four ounces of water, they were boiled for a short time over a slow fire. When the mixture had cooled sufficiently, he examined it, and found that by means of the mucilage, the greatest part of the resinous precipitate had been dissolved. The liquor was high coloured, exceed-

ingly bitter, and, upon the addition of a chalybeate, it assumed a dark colour, and became very turbid."

"It is undoubtedly true, that when a quantity of water is added to a tincture of bark in pure spirit, a resinous deposition will ensue, which, be it ever so carefully washed, will still retain a certain impregnation of the original concomitant principles, but in so small and inadequate a proportion, that the foregoing inference cannot, I conceive, be admitted. Neither do I see any reason, why bitterness and astringency should be referred to gum or resin, more than sugar or acid, or any other constituent part of vegetable matter."

Of the Aqueous and Spirituous Extracts of Yellow Peruvian Bark.

“ There being in general in the pharmaceutic treatment of bark, particular attention paid to the properties and produce of its extract, I have therefore, with regard to this part, endeavoured to be more especially attentive. It has been already said, that from a cold infusion prepared from five pounds of yellow Bark, there were obtained fifteen ounces of extract of a dark brown colour, somewhat transparent, and extremely bitter. In this experiment however, the object was not so much to ascertain the quantity as the kind of extract which a cold infusion would produce. The

College orders two kinds of extract ; one made by boiling a certain quantity of the bark in repeated portions of water, straining the decoctions whilst hot, and evaporating them to a proper consistence ; the other, by digesting first in rectified spirit, then making a decoction of the residuary matter in water, and uniting the products after each liquor has been separately evaporated. According to the first process, ten pounds of yellow Bark yielded four pounds and two ounces of extract, of a pillular consistence, (for the watery extract of bark is directed in a double form ; soft, or of a proper consistence for being made into pills ; and hard, so as to be reducible to powder.) Ten pounds of red Bark yielded four

pounds one ounce of extract, of the same consistence; and ten pounds of common Bark yielded but two pounds nine ounces. All these extracts are opaque, of a dark brown colour, very bitter and astringent, and perfectly free from empyreuma. The common, appears to be the smoothest and most plastic; the red the most brittle; the yellow is of a lighter colour than either of the others, and far more powerful in taste. Of the resinous extracts the products are different. By the use of both water and spirit, a pound of common Bark yields only two ounces three fifths; a pound of red Bark two ounces six eighths; and a pound of yellow Bark no less than four ounces, which agrees in a great

measure both with the former statement, and the produce of the evaporated tinctures. The refinous extract of yellow Bark is rather of a lighter colour than the aqueous ; it has likewise a certain degree of transparency, but in its other properties, except with regard to solubility, there is no remarkable difference.”

“ How necessary it is to be particular in the conduct of such preparations, may be seen in an experiment by Dr. Percival, where the astringency of a watery extract is said to be inferior to that of an infusion of the bark by trituration ; which certainly could not have been so stated had the extract been good.”

“ But as far as I have had an opportunity of judging, the purest and most elegant extract is not to be obtained from this bark, by either of the foregoing processes. What appears to me preferable, is to digest it first in rectified spirit, which I consider as the most perfect menstruum, and after filtering the tincture, to distil off the spirit in a balneum. By this simple method of proceeding, whatever be the virtues of the subject, the extract must of necessity contain them. On the one hand, the bark is rendered completely inert, on the other, the spirit is brought over without the slightest trace of impregnation. The produce of such spirituous

extract is, three ounces from twelve of the bark. In its appearance it very much resembles the foreign Peruvian extract, which, I have no doubt, is also a spirituous preparation, and though exceedingly powerful both as to its bitterness and astringency, it possesses a peculiarity of flavour, to many by no means unpleasant.”

“ In the preparation and subsequent examination of these extracts, I have had a particular view to an analysis of red Bark published a few years since by Mons. Fourcroy, in which the properties of that bark are contrasted with those of the Quinquina of St. Domingo, which this celebrated

chemist selects as an example of dry vegetable matter in general. After making an infusion of the powder of red Bark in water, and endeavouring to shew that it contains a peculiar acid; Mr. Fourcroy next attends to the changes it undergoes on boiling. By repeated decoction in water, he extracts from a certain quantity of the bark, the whole of its sensible properties; then, by a cautious evaporation, during which time the liquor is twice allowed to cool, he collects all the solid contents. These amount only to a sixteenth part of the whole, and on being redissolved in distilled water, shew signs of acidity. Mr. Fourcroy further states, that the solution of this

watery extract, as it may be called, on being mixed with lime water, gives out a volatile alkaline odour; that it yields an earthy precipitate on the addition of a solution of pot-ash; and on being evaporated to dryness furnishes muriatic acid, by means of the acid of vitriol. From these and many other experiments, the general inference is, that, water extracts from bark, a small quantity of saline matter, a little mucilage, and, a reddish brown extractive resinous substance, the properties of which are very different from those of any other extract we are acquainted with. That this substance presents itself under different forms, from that of a resinous extract, to resin of the

purest kind, according to the proportion of the pure air or oxygen with which it has had an opportunity of combining. Hence the difference in the qualities of infusions, decoctions, and extracts. That it is this which separates, when a decoction of bark is allowed to cool, and by appearing sometimes in the form of a brown insoluble powder, has either been taken for an earth, or for a decomposed resin. However, upon a repetition of most of Mr. Fourcroy's experiments, I am sorry to say, that the result has by no means corresponded with what this ingenious chemist has stated; on the contrary, I am thoroughly persuaded, that the materials which

he employed in his analysis were either originally bad in their kind, or that he had allowed them to spoil before his observations were made on them.”

“ With regard to the more immediate subject of this letter, I have at present little further to add. On so new and interesting an occasion there will probably be many opinions, and much still remains to be done. So far however, it already appears very plainly, that if there be a proportionate connexion between the medical effects and the sensible pharmaceutical properties of the Peruvian Barks, the yellow species of it cannot fail to be a remedy superior

in efficacy to all the others. Whether it is so in reality experience alone must determine. I can take upon myself to say, that in all its forms it may, as a general remedy, be as safely and as freely employed, as any other kind of bark we are acquainted with. And from the many cases in which I have myself seen it given with success, as well as from the favourable accounts I have received of it, from several of my most respected friends; I doubt not, but that it will shortly be much sought for, and held in very general estimation.

“ I refer more especially to Dr. John Lind, of the Royal Hospital, Hasler; Dr. James Curry, of

Kittering, Northamptonshire ; Mr. Richard Stocker, Titchfield Hampshire ; Mr. William Gaitskill, Rotherhithe ; and Mr. Lancelot Hare, Southminster, Essex ; who have done me the favour to make this new species of bark the subject of particular observation, and whose reports respecting it you will have great satisfaction in consulting.”

I am, &c.

W. BABINGTON.

FROM what has been advanced in this Inquiry, respecting both the natural and chemical properties of the yellow Peruvian Bark, I trust every impartial reader must be convinced, that it promises to be of important use to the medical practitioner. For, by examination and comparison of the barks of the various species of *Cinchona* with each other, we learn, that the sensible qualities of this bark are perfectly reconcileable with those of the best kind ; while a chemical investigation of it, on which most reliance is to be placed, has proved it to contain a greater proportion of efficient and soluble matter, than the best pale, or even red bark now in use.

Though this might be considered by many as a sufficient proof of the superior efficacy of the yellow Bark, yet it was solely from actual trials of its effects in disease, producing the most successful results, that determined me to recommend the drug to public notice. I should however have had less confidence in my own observations and experience, had not all the chemical tests to which the yellow Bark has been subjected, afforded a very satisfactory collateral evidence of its active powers.

To attempt to explain the *modus operandi* of Peruvian Bark, in the cure of disease, would lead me into a wild and sterile field of theory and hypothesis, which has been

long, and in my opinion unprofitably cultivated by others,

The principal, and probably the only efficient qualities of the bark, are its bitterness and astringency; but whether it acts simply by the union of these two properties, or by some peculiar combination or modification of them, or whether its efficacy depends upon a power *fui generis*, or what has been called a specific quality, is a question not yet fully decided. Those who maintain the former opinion, contend, that the medical powers of the bark are proportioned to its sensible qualities; while the advocates for the latter opinion assert, that no artificial composition of bitter, astringent, and other mat-

ters, though infinitely more powerful than those found in the Cinchona Bark, is of equal efficacy in the cure of agues. However, as bitterness and astringency are admitted by all to be the only ostensible evidence of the medicinal utility of Bark, and without which it would be deemed useless and effete; it may be fairly inferred, that the yellow Bark, as possessing these qualities in the greatest degree, should be employed in preference to that of any other species of Cinchona.

Much has been ably written on the subject of the Peruvian Bark, and the different cases indicating its use, have not only been fully pointed out, but also the most effectual way of exhibiting it, has

been stated by physicians of great professional experience ; and by none more judiciously than by my friend Dr. Saunders.

It would be superfluous therefore to enter upon an examination of the various disorders requiring the yellow Bark, which is not considered here in a new character, but as only possessing the medical powers of common Bark in a greater degree.

The febrifuge power of the Peruvian Bark, or that by which it stops the recurrence of febrile paroxysms, first established its importance ; and by the comparative smallness of the quantity of the bark required to produce this

effect, we are, *ceteris paribus*, best enabled to estimate its goodness or relative efficacy. It is true, that some intermittent fevers are infinitely more severe and less tractable than others, as depending upon the season of the year, and the nature and constitution of the patient. Thus a mild vernal ague may be cured, not only by the least efficacious of the Peruvian Barks, but also by various other bitter and astringent vegetable substances. While on the other hand, intermittents sometimes occur, in which large and repeated doses of the most powerful species of the Peruvian Bark, have been found ineffectual, and hence arsenic and such like violent remedies have been resorted to.

I trust, however, that from the general and successful experience which I have had with the yellow Bark in many inveterate agues, it will seldom if ever be found necessary in such cases, to employ any other febrifuge.

At Guy's Hospital I have had frequent opportunities of treating agues of every description, for though this disease does not very frequently originate in London, yet it is often brought into the metropolis, especially with the poorer orders of the community.

The labourers employed at the harvests in the fenny parts of Essex, and the hop-gatherers in Kent, annually supply the Hospital with a

number of patients in every type and state of intermittent fever; from which, both my colleagues and myself have had ample experience of the effects of yellow Bark. And I am authorised by Dr. Saunders and Dr. Hervey, to say, that in the various cases in which this drug was used by them, it proved invariably successful; nor has my own practice furnished me with a single exception.

I have repeatedly prescribed this bark in the various forms of powder, decoction, and extract, on each of which it may be necessary to make some observations.

Bark in the form of powder, is for obvious reasons justly considered

the most efficacious form in which it can be administered. Half a dram of the yellow Bark in this state, given every two hours, has in general been found sufficient to cure in a few days the various intermittents which have fallen under my care, excepting only some peculiar cases evidently connected with visceral obstructions, in which I not only had recourse to calomel, but also found it expedient to increase the dose of the bark. Judging however from a great number of cases, I am perfectly satisfied that the yellow Bark manifested nearly a double proportion of febrifuge power to that of the common Bark; as most of the agues treated at the Hospital, were not to be subdued by giving

less than a dram of the latter bark every two hours.

It has been hinted to me, that the bitterness of the yellow Bark is so intense, that few stomachs would bear a large dose of this drug without nausea and sickness being induced; but this opinion is wholly unfounded and contradicted by experience.

Its bitterness, though certainly excessive, is however not of the nauseous kind, and has in many instances proved more acceptable to weak dyspeptic stomachs, than an equal quantity and a similar preparation of the common Bark. Therefore this quality of yellow Bark, on which much of its effi-

cacy probably depends, gives it peculiar and important advantages, which shall be noticed more fully hereafter.

But while we admit that the bark may be administered most efficaciously in substance, yet in some conditions of the stomach, the powder of none of the species of this drug can be taken in such large and repeated doses, as many intermittents require ; besides, a considerable degree of nausea and sickness often accompanies these disorders through all their stages. It therefore becomes necessary to employ some other preparation of this medicine, more likely to agree with the stomach, and in which the dose of the bark is

not unnecessarily enlarged by any of its effete and insoluble matter ; for I conceive that in most instances, it is owing rather to the quantity than to the quality of this substance that it offends the stomach.

This leads me to speak of the decoction of the yellow Bark, which though strongly impregnated with the sapid principles of the drug, has not been found more disagreeable to the organs of digestion, than that prepared from the common Bark.

This observation to many may appear somewhat paradoxical, but when we consider that the nauseousness of medicines, is far from

being proportioned to the intensity of their bitterness, a principle of analogy arises perfectly reconcilable with the fact here stated. Indeed I have never observed, that the decoction of yellow Bark was by those who took it, complained of as unpleasant, though I have known a quart of it to have been drunk, between the hours of breakfast and dinner.

The experiments of my friend Mr. Babington clearly show, that the decoction of the yellow Bark resists the putrefactive tendency a much longer time, or is more antiseptic than that prepared from the common or red Bark, and this is certainly to be regarded as one of the many proofs of its superior efficacy.

But my experience enables me to say, that most intermittents which occur, may be completely cured by this decoction, and that in a general way, it will be found an effectual and pleasant substitute for the powder. I must confess, however, that those agues which have occurred to me in private practice, and where I have been particularly solicitous to avert a subsequent paroxysm of the fever, I have commonly directed ten grains of the powder to be added to an ounce and half of the decoction, and by giving this every two hours, I have never been disappointed in preventing the usual return of the disorder.

In remittent fevers, typhus, and other continued fevers, the decoction of the yellow Bark has also been successfully employed; and to these I may likewise add acute rheumatism. For though this last disease is manifestly of the inflammatory kind, yet a remission of the febrile symptoms generally takes place to a degree more or less evident, in the course of every diurnal revolution. In such cases I have no hesitation in saying, that, notwithstanding the siziness of the blood, and the continuance of the inflammatory symptoms, bark may be safely and efficaciously employed: and under such circumstances I have usually had recourse to the frequent and free exhibition of the yellow Bark

during the day, and previous to the evening exacerbation ; which I have found to be a very successful practice, and for which I am indebted to Dr. Saunders, who has adopted it many years, and frequently causes the Bark to be accompanied with both general and topical blood-letting.

In scarlatina, erysipelas, and in short in all the common disorders either acute or chronic, requiring Peruvian Bark, I have had much experience with this new species of it, especially in the form of decoction ; from all of which I am fully convinced that on every consideration, it should supersede all the other kinds of Cinchona Bark now in use.

The great bitterness of this bark gives it a peculiar advantage in bilious and dyspeptic disorders, and I consider that in the state of infusion, it may prove an efficacious substitute for all the medicinal bitters. Its bitterness is such, that to the taste its astringency is almost entirely concealed, and hence it may be less heating to the system, and can be employed more successfully in the earlier stages of fever than the common Bark, the astringency of which appears to be in a much greater proportion to its bitterness.

Another advantage of the yellow Bark, still more important is, that in many fevers of the remittent kind (particularly those of warm

climates) in which a superabundance of bile in the primæ viæ may contract, indicate the use of common Bark, the yellow Bark by its superior bitterness, seems to be peculiarly adapted.

The remarkable bitterness of yellow Bark appears in a very striking manner from the experiments of Mr. Babington, who relates, that five pounds of this bark in powder strongly impregnated this quality by cold infusion to above one hundred gallons of water, and which upon evaporation yielded of extract, one fourth part of the weight of the powder, employed. The residuum still however possessed a degree of bitterness and astringency equal to those

of the common Bark ; and an opportunity offered of proving that it was not inferior in point of efficacy. For having admitted into the Hospital, a man, who had for six months laboured under an intermittent, and for which he had not only taken the various forms of common Bark, but also arsenic ; I ordered a dram of this residuum when dried, to be given to him every two hours, this averted the next expected paroxysm, and by repeating the dose at more distant intervals, he continued well,

My objection to the employment of bark in powder, arises, as before observed, from the quantity necessary to constitute a dose, and from the difficulty of many sto-

machs in retaining and digesting such large and repeated doses as some intermittents require. To many also, any fluid form of the bark is extremely unpleasant and nauseating, with such we are necessarily obliged to resort to the extract, formed into pills. For this purpose, the spirituous extract of yellow Bark, prepared according to the process related in the experiments, will be found a convenient and efficacious form, as containing all the medical powers of the bark in the most concentrated state. According to the calculation of Mr. Babington, fifteen grains of this extract, are equal in efficacy to a dram of the powder, and my experience enables me to say, that

the utmost reliance may be placed on this preparation. Besides, when the tone of the stomach is much weakened, it is probable, that this organ, though able to retain the powdered bark, may not possess sufficient power to thoroughly digest and extract its virtues; therefore the extract of the bark, in which the efficient parts of the medicine are already evolved by artificial means, will not only be more easily digested, but also pass more readily into the system.

Before I conclude this Inquiry, I have to observe, that the subject of it has within the last six weeks become much more generally known, especially in this metropolis; and I have lately conversed

with several medical men, who have had occasion repeatedly to employ the yellow Peruvian Bark, all of whom have been so well satisfied with its efficacy, as to prefer it to the other Peruvian species. These opinions, and the voluntary written testimonies here subjoined, which have come into my possession since the commencement of this Inquiry, have, I confess, afforded me great satisfaction; and I already begin to feel additional gratification in thinking myself instrumental to much public good, by calling the attention of the faculty to this new medicine.

A LETTER FROM DR. WOODVILLE, PHYSICIAN
TO THE SMALL-POX AND INOCULATION
HOSPITALS.

DEAR SIR,

HAD you required any speculative opinion of mine, with a view to its publication, I should have opposed it, as presumptuous on my part, and unavailing on yours; but as you request only the statement of a matter of fact, concerning the effects of the yellow Bark at the Small-pox Hospital, I most willingly comply; feeling no other restraint than that arising from an extreme caution not to represent the efficacy of that bark in a more favourable light than all the circumstances fully warrant.

Though I generally deem the exhibition of the bark inadmissible, during the early state of the variolous eruption, yet in the

latter stages of it, and in sphacelous sores, and various other affections, either accompanying the casual small-pox, or superinduced by it, the Cinchona Bark is employed as the chief indicatum, insomuch, that recourse is had to this medicine sooner or later, with nearly one half of the patients admitted into the Small-pox Hospital.

It is more than seven months since I first began to prescribe the yellow instead of the common Bark at the Hospital, desiring Mr. Wachsel the apothecary, to observe attentively whether its effects appeared to him more or less beneficial than the common bark had been in similar cases. I had soon the satisfaction to find that his observations coincided with mine, in determining, that in a great number of variolous cases, of the similitude of which the disease furnishes peculiar visible evidence, the comparative efficacy of the yellow Bark

unequivocally excelled that of the common Cinchona.

I was so fully convinced of the justness of this conclusion, that in April last it was noticed in Medical Botany, (Part II. No. 6.) I must remark however, that respecting the febrifuge effects of this new bark, I have no experience; for my observations, which were founded on more than one hundred instances, relate entirely to its tonic or antiseptic powers.

After what has been said, it is scarcely necessary to add, that I hold the yellow Bark in great estimation, and as it commonly agrees with the stomach in large doses, and seems less liable to disorder the bowels than

*that of the other species of Cinchona, I have
no doubt in giving it a decided preference.*

I am, Dear Sir,

Your faithful Friend,

W. WOODVILLE.

Small-pox Hospital,
June 20, 1794.

A LETTER FROM DR. LIND, PHYSICIAN TO
THE ROYAL HOSPITAL AT HASLAR, TO
MR. BABINGTON.

DEAR SIR,

I BEG to acquaint you that I have made trial of the yellow Bark which you sent to me in five cases of agues, one quartan, three tertians, and one quotidian ; in two cases of malignant fevers ; in three of weakness of the stomach, one succeeding a fever, and two succeeding a dysentery ; and in several cases of general weakness after fevers. In all it produced the usual effects of common Peruvian Bark. The agues were completely cured by it. It was given in the same forms and doses as com-

mon Bark, and by its effects could not be distinguished from it.

I am,

Dear Sir,

Your most obedient humble Servant,

JOHN LIND.

Royal Hospital at Hasler,
21st Nov. 1793.

THE FOLLOWING WAS RECEIVED FROM MR. JONES
OF GRACECHURCH-STREET.

TO DR. RELPH.

DEAR SIR,

IN compliance with your request I send you the following remarks on the yellow Peruvian Bark, and if they should prove useful and fall within the design of your intended publication, they are entirely at your disposal.

In the space of two years, I have used nearly four chests of this bark. I have not only discovered, that in all cases it is capable of doing every thing which can be done by the best pale Bark, but in obstinate cases of intermittents, in which common Bark has failed, it has invariably cured the disease.

I have experienced no inconvenience from

its bitterness; it does not nanseate the stomach, nor irritate the bowels; and in fevers of a typhous and continued kind, it appears to me to have a peculiar effect in cleaning the tongue, and at the same time promoting the necessary secretions.

If I were desired to estimate its comparative effects, I should affirm, that half a dram of it is equal in point of efficacy, to a whole dram of quill-Bark, and that it has a decided advantage over red Bark, by being much more acceptable to the stomach. It may be preserved in decoction for a very considerable time, even in hot weather, which, in my opinion, is an infallible proof of its superior antiseptic powers.

I have the honour to be,

Dear Sir,

Your obedient and very humble Servant,

J. JONES.

Gracechurch-street,
July 10, 1794.

I WAS FAVOURED WITH THE FOLLOWING
LETTER FROM MR. GAITSKELL.

TO DR. RELPH.

DEAR SIR,

As the yellow Bark has been the subject of your particular inquiry, and a complete investigation of its powers the summit of your wishes, every elucidating fact of its medical influence may be acceptable; therefore, agreeable to your request, permit me to contribute the little information a few months experience has furnished me.

My essays were made on specimens presented me by my much esteemed friend Mr. Babington. From experiments on its sensible properties I had evidence of its superior powers, and from its application in practice,

the fullest confirmation of my hopes. I wrote Mr. Babington my opinion, that after twenty five trials of this bark, it accomplished the cure of diseases in much smaller doses than usual; a great desideratum in medicine, as the quantities of pale Bark requisite in obstinate cases of intermittents, frequently prove objections to its exhibition. After six months trial of this medicine, in more than four hundred different patients, I have no hesitation in asserting, that half a dram of yellow Bark is competent to effect more than double that quantity of pale Bark.

The most excruciating pains in the head of the true quotidian type, tertian and quartan intermittents, typhous remittents, leucophlegmasia, dyspepsia, leucorrhœa, rheumatismus chronicus, erysipelas, anthrax, and variola confluens maligna, have all been subjected to its action, and in general with the happiest success. In each of these cases

the article was administered in substance, excepting in dyspepsia and leucorrhœa, which yielded more readily to the lighter preparations of it, as the infusion or decoction.

The medicine agreed well with my patients in general, it cheered their spirits, improved the appetite, and restored the weakened energy of the system. In two scruple doses it sometimes produced nausea at the stomach, or occasional diarrhœa, which suffered mitigation by laudanum, in combination with aromatics, or reducing the quantum of bark.

Its power on intermittents was speedy and effectual in every instance but two, which resisted all sorts of cortex, and ultimately yielded to arsenic. I shall conclude these remarks with mentioning, that my partner Mr. Maddox and myself, are so perfectly

*satisfied of its pre-eminent utility, as to
adopt it in practice to the total exclusion
of the other barks.*

I remain with the greatest respect,

Yours, &c.

WILLIAM GAITSKELL.

Rotherhithe,
June 9, 1794.

EXTRACT OF A LETTER FROM MR. JENNER,
AT PENSWIC, IN GLOUCESTERSHIRE, TO DR.
CHESTON, OF GLOUCESTER.

June 11, 1794.

“ IN answer to your inquiry, relative to the effects I have observed from the use of the yellow Bark, the following case speaks much in its favour, being indeed the only ague I have for some time had under my care,

“ A. W. after her lying-in, laboured under a fever, attended with great weakness, and which at last terminated in a regular quotidian. I administered the red Bark in substance, but it would not stay upon her stomach. I then tried the Angustura Bark, which she kept down in sufficient quantity, but without producing the effect desired. I then gave her four doses

of the yellow Bark, two scruples in each, which put a stop to her fit immediately; the next day she repeated the powders, continued well, and has had no return since. This happened in February last. I have since given it in cases of debility with very good effect, and observe one great advantage in using it, that a smaller quantity seems to produce the same effect as a larger one of the common Bark."

EXTRACT OF A LETTER FROM MR. HARE, AT
SOUTHMINSTER, ESSEX, TO MR. BABINGTON.

November 12, 1793.

“ As you seemed desirous of being informed of any further particulars respecting your new bark; in addition to my former account I have only to add, that I have extended the consumption as much as possible, both gratuitously and otherwise, and that it has uniformly succeeded to my most sanguine expectations. In the cure of agues, both tertians and quartans I have usually given from eight to twelve drams during one intermission, and in those cases where sufficient time has elapsed to enable me to judge, I think the tendency to relapses has not been so great, as after the exhibition of the other sorts of bark. It has succeeded equally well in remittents of

all kinds. I am now giving it for the cure of a large ulcer of a very malignant kind. I have had experience sufficient to convince me, that it possesses all the virtues of the best Bark we are at present acquainted with."

MR. STOKER, OF TITCHFIELD, HAMPSHIRE,
COMMUNICATES THE FOLLOWING TO
MR. BABINGTON.

“ I HAVE been using the yellow Bark, and can say, it has in every instance produced all the effects I could have expected from the other barks. In the numerous cases in which I have administered it, it has never disagreed with the stomach. Four doses of decoction cured an ague of six weeks ; six drams of powder, another of three weeks ; but when I am more at leisure I will communicate to you more particulars respecting this bark, as I am at present engaged in examining it pharmaceutically by means of different menstrea.”

EXTRACT OF A LETTER FROM MR. NEWELL,
AT COLCHESTER, TO DR. SAUNDERS.

April 20, 1794.

“ I HAVE used the yellow Bark in several cases of intermittents, which are common diseases with us, and with great success. It appears to me to be much stronger than the pale Bark, and full as strong as the red Bark. I have cured several intermittents with only three drams of it, after the use of an emetic; and indeed that quantity either of it or the red Bark, has been commonly found sufficient with me to stop an ague fit. I can say nothing with regard to its chemical analysis, but from its sensible properties, I think it much more bitter than the common Bark.”

A LETTER FROM MICHAEL O'RYAN, M. D.
LATE PROFESSOR OF THE PRACTICE OF
MEDICINE IN THE COLLEGE OF LYONS IN
FRANCE, AND FIRST PHYSICIAN TO THE
GRAND HOTEL DIEU OF THAT CITY.

TO DR. RELPH.

London, July 11, 1794.

SIR,

THOUGH the observations contained in this letter may, after what you have written on the subject of Yellow Bark, be found, in a great measure, unnecessary, they will at least serve to shew, that whatever may now be asserted in favor of this important remedy, cannot surpass what the fairest trials, given it on the Continent for these seven years past, have established in the most incontestible manner.

The Yellow Bark was presented to the Council of Administrators of the Hospital, or GRAND HOTEL DIEU of LYONS, in the beginning of the month of November, 1786, by the house of Mess. Rey & Co. who had just received a very large quantity of it from their friends at Cadiz. The history given of it by these gentlemen was, that the Peruvian Mountaineers having made an irruption into the Spanish possessions, and having been not only repulsed but pursued very far into the mountains; the army, on its return, discovered many trees which furnish this Bark, much more lofty and large than those which grew on the lower grounds; the soldiers stript them, and each brought home a load of the Bark, which being bought up by the Spanish merchants established at Peru, was sent to Cadiz. It was further added, that several persons to whom this Bark had been administered by the physicians of Cadiz, received the greatest benefit from it.

The Hospital of Lyons had an exclusive privilege from the Kings of France, exempting it from paying duties on any article imported for its use:

this enabled the administrators to keep the most complete pharmaceutical collection in Europe: it was the Hall which supplied not only all the apothecaries shops in Lyons, but those also in all the surrounding towns; for the druggists and apothecaries found it much cheaper and less troublesome to deal with the administrators, than to import their drugs, and prepare them themselves. The profits which accrued to the house from this branch of trade alone, amounted to an hundred pounds sterling a week, exclusive of all kinds of remedies furnished to the patients, the number of whom exceeded very often twenty thousand yearly. The stores, particularly of simples, were immense; that of choice Bark was very considerable, its prime cost amounted nearly to a thousand pounds; of course, had the Yellow Bark been found by experience and observation to surpass it, the loss sustained by the Hotel Dieu must have been very considerable.

I hope, Sir, you will excuse this digression, which I thought necessary in order to shew, that if the Yellow Bark came into such repute as to be almost the only species of this valuable remedy

employed in Paris, and all the other cities in the kingdom, in the space of a few months after it was examined by the physicians of the Hospital of Lyons; it is to its own superior merit it owes this preference, and not to any of those mean mercenary views and practices to which so many other remedies are indebted for their short-lived celebrity; a circumstance which, in my opinion, is no small commendation of it.

By a law of the hospital, a General Council was directed to be held on the first day of each month, to enquire into the state of the house; it was composed of the thirteen administrators, the four physicians, the first surgeon, and the first apothecary. Every reform or improvement that was proposed by any of the members was debated, and then accepted or rejected by a plurality.— Although the time of the meeting of this assembly was not far distant, the administrators, actuated by the laudable desire of converting, without the least delay, this remedy to the use of our patients, if it answered the encomiums made of it, invited their physicians to meet and examine imme-

diately the Yellow Bark, in order to be able to deliver their opinion of it at the ensuing general assembly.

The samples that were laid before us consisted of large pieces, some covered with the outer thin skin, others entirely stript of it, and quills: the former clearly belonged to the trunk of the tree; the latter to the smaller branches: the colour of the large pieces, as also of the quills when broken or opened by a short maceration in water, was yellow, slightly inclining to red.—We all agreed, that it was bitterer than any other known Peruvian Bark, but more aromatic, consequently less nauseous. When exposed to the sun, we observed that its inner surface particularly exhibited an infinite number of sparkling points, which denote an abundance of resin—boiled for ten minutes over a brisk fire in the Rhone water, (which we knew by our experiments on the waters of Lyons to be the purest) in the proportion of half an ounce to a pint, the decoction was of a fine yellow colour, slightly inclining to red, bitter and aromatic to the taste. Upon examining the residuum we found it

still heavy, its texture not much impaired by boiling, and when chewed, bitter and aromatic. Concluding from this, either that it had not boiled long enough, or that the quantity of water was not sufficient to extract its contents, we ordered it to be boiled in the same decoction for ten minutes longer; but this not appearing to us much stronger than the former, and perceiving that the weight, texture, and other qualities of the bark were not sensibly diminished, we had it boiled for a quarter of an hour in half a pint of fresh water, and found that this second decoction was very near as strong as the former. The liquor, laid by in bottles, did not deposit, after standing two days, any thing like the quantity of sediment as that of the common bark.

We then proceeded to inquire into the quantity of extract contained in the Yellow Bark; and in order to establish their comparative merits, we also ordered separate extracts to be made at the same time, from a like quantity of common Bark of an inferior kind, which had been laid by for external use, and enemas, and from our selected red

Bark. The quantity of an agreeable bitter and aromatic extract obtained from the Yellow Bark was three times that yielded by our common bark, and just double the quantity which our selected red Bark afforded. These experiments, repeated several times before the meeting of the General Council, having invariably afforded the same results, we delivered a report on the first of December; the substance of which was, that both from its sensible properties, and our pharmaceutical observations, the Yellow Bark appeared to us far superior to any species of other bark with which we were hitherto acquainted. But as it sometimes happens, that medicines do not answer in practice the expectations raised by their analysis, we recommended that only such a quantity of this remedy should be purchased as was necessary to give it a trial on our patients, the considerable number of whom would soon enable us to give a decided opinion respecting its qualities.

The City of Lyons is circumscribed on all sides by lofty mountains; two great rivers, the Rhone

and Saone, running on the north-east and south-west sides of it, keep up a constant filtration through the gravelly soil on which it is built ; these circumstances, joined to other causes, subject its inhabitants, particularly the poorer sort, who mostly live in vaults and other damp places, to all those disorders which are most prevalent in marshy or moist soils. Thus the intermittent and remittent fevers, the dysentery, &c. are endemical in this city.

The intermittent fevers generally manifest themselves in the beginning of the month of September, and cease towards the end of November ; some of them however run on to the following spring, changing their type several times during the winter. The remitting fever is mostly of the slow nervous, or of the putrid kind. The nervous sets in in the months of April and May, and disappears when the violent heats of June and July begin ; it returns again in the months of October and November, and if the ensuing winter happens to be moist and warm, as is frequently the case in that climate, it does not

cease entirely until about the middle of May; a smart frost however, or a considerable fall of snow, which sometimes happen in the months of December or January, never fail to check its progress, or even put an entire stop to it during that season.

The putrid remittents make their appearance towards the middle of June; when the heat is very intense, and not tempered by frequent showers of rain, its effects are very pernicious: the disorder becomes more epidemical, but less dangerous in proportion to the moisture of the summer; when this is copious, though they continue until the middle of October, still the exacerbations are not attended with any alarming symptoms. Those that are not cured at this period, degenerate into autumnal intermittents, many of them continue through the winter, until the first months of the following spring.

The winter at Lyons in 1786, was remarkably wet and warm, as was also the spring of 1787, so that not only the recovery of patients

attacked in the hot months and autumn, with the foregoing fevers and dysentery, was very slow, but also there appeared but very little abatement in the intenseness of the slow and nervous fever, and an unusual number of putrid ones were observed to break out even in the midst of this season.

Were we to have no further proofs of the virtue of Yellow Bark, than those with which it furnished us from the middle of November until the beginning of April, these alone would be sufficient to establish its very great superiority over every species of this remedy hitherto known. As Physicians advance in years and practice, enthusiasm in favour of any remedy whatsoever gradually wears off; their ardent hopes of success from remedies extolled as specifics, even by authors of the first note, have been so often baffled, that a salutary pirrhonisme at last takes place, which prevents their lavishing encomiums on any of them, which are not founded on undoubted facts. On these grounds I can safely assert, that out of many hundreds of cases, wherein this bark

was administered in our Hospital, I do not recollect even one in which it failed of success: nor was it necessary to use such large quantities of this species of Chincona as of the others in order to produce the desired effect: experience soon taught us not only that three drams of Yellow Bark were equal in virtue to an ounce of our other best bark, but also that when once the return of the paroxysm was prevented by its use, (and even in many extraordinary cases one ounce was equal to the task) it was needless to employ it any longer as a febrifuge; the fever was cured, and nothing more than a proper regimen was requisite to restore the patient to perfect health.

Several members of the College of Physicians, who were invited by us to the general assembly of December, and had examined the samples of the extract which we produced, having made much use of the Yellow Bark during the winter in their private practice, and attended to our visits in the hospital, now not only extolled it in private, but also two of them published works filled with its praises: the Physicians of the Hotel Dieu how-

ever deferred giving their final approbation, until they should have an opportunity of employing it in the putrid remittent fever of the summer, in which they could obtain an unequivocal test of its virtues. But as the encomiums given it in the publications just mentioned, began to make the public acquainted with its excellent qualities, and that consequently its price was daily augmenting, they recommended to the administrators to buy up, without loss of time, a very large quantity of it, lest the poor of the Hospital should be stinted by its becoming dear.

During the months of April and May, 1787, the Yellow Bark was employed but very seldom in the Hotel Dieu; a fever of the catarrhus kind, but benignant, reigned very generally at that period; and though it assumed in many cases the type of a double tertian, still we preferred letting it take its course, and dwindle away, which it seldom failed to do, by gentle sweats, and an expectoration of a mucous nature, in the space of seven or nine days, rather than stop it with the bark, as we had many instances on former

occasions of consumptions and other disorders of the breast being brought on by this latter practice.

Early in June this fever began to assume a most serious aspect ; it still as at its commencement retained its double tertian type ; but after the fourth day from its invasion it generally became continual ; the signs of putrefaction were evident not only from the offensiveness of the stools, but also from the scent of the sweat and breath ; each exacerbation was attended with violent and fruitless efforts to vomit, which were succeeded by so great a prostration of strength, that the worthy lay-nuns who attended the sick, often thought the patient was really dead. Many were covered with dark and livid spots, or petechiæ ; and indeed in so dissolved a state did the blood appear, that the sputum was very generally tinged with it.

As the Hospital of Lyons is one of the best aired and cleanest in Europe, and that the patients, so far from being crowded, were laid in separate good beds, placed at the distance of three feet one from the other, we were for many days

at a loss to account for the cause of so malignant a disorder ; and it must be owned, that before we recovered from our surprise and doubts, many were lost, who, as we had strong reasons to believe afterwards, might have been saved, had we not from experience, dreaded the effects of the Bark, in the spring catarrhus fevers of that climate.

Soon perceiving, however, that most of the sick, who were brought in great numbers, were either prisoners, or persons who dwelt very near the two goals, St. Joseph, and La Quarantaine, six Commissaries, four of whom were the Hospital Physicians, were immediately appointed by the College, to examine into the state of those places, and the adjoining houses. The result of this inquiry was, that the Intendant of Lyons having given orders to arrest the beggars and vagabonds that could be found in the city, and on the roads about it ; but not having the foresight to appoint some proper place in which to confine them, crowds were thrown into these prisons, already too full ; and when the intenseness of the heat was considered,

as also the walls which closely surrounded those houses, by their extraordinary height, prevented a free ingress and circulation of air; that the windows of these jails were very few, and very small; that the straw on which those miserable creatures lay was half rotten; it was evident that the fever with which three-fourths of the prisoners were then attacked, was the jail distemper; that the disorder had already spread itself among the neighbours, and caused a great mortality.

In consequence of this information the utmost diligence was employed, in opening fresh wards in the Hospital, wherein not only the patients who had any symptom of this contagion were immediately deposited, but also for the reception of all those who should be brought in from the prisons and their neighbourhoods. A provision of the Yellow Bark was sent into the jails, and a reasonable quantity of it was distributed to the families who, by their proximity were most exposed to infection, with short printed instructions for employing it. The Physicians of the Hotel

Dieu, who gave these directions, advised, that each prisoner though not in the fever, should take as a preservative, a dram of this remedy, boiled in half a pint of water every day; and that those who actually laboured under it, should begin immediately after the paroxysm, to take four ounces of a decoction of the Yellow Bark, made in the proportion of half an ounce to a quart of water, every two hours, and continue its use, even in the future fits, until the patient should have taken of six quarts.

I have already trespassed too much on the limits of a letter, to attempt describing the many extraordinary cases in which the *Cinchona flava* gave constant proofs of its excellence during the reign of this epidemic distemper: Let it suffice then at present to declare, that on this most emergent occasion, as well as on every foregoing and subsequent one, it never once failed to answer our most sanguine expectations.

Our final opinion therefore, given at the General Assembly, on the first of October, 1787, was highly in its favour, and from that period

until the middle of September, 1792, when I fortunately made my escape out of that guilty and distracted kingdom; its reputation rose to such a pitch that though its price became enormous, (selling there at the rate of three shillings and sixpence an ounce) it was the only species of Cinchona employed, particularly in any disorder which appeared in the least dangerous, and therefore required a certain and speedy remedy.

I own, Sir, that on my arrival in England, I was equally surpris'd and concerned to find that this valuable remedy was unknown here except to a few empirics, who, according to the custom of this set of men, were vending it very dear, under feigned names, as a secret for the cure of fevers;—your learned work however will soon rescue it out of their hands, and from obscurity; and to you only will be due the praise of making your country acquainted with a remedy, the useful qualities of which every physician will allow when once he has given it a fair trial.

I am, Sir, &c.

MICHAEL O'RYAN.



My Dear aunt have the
opportunity to visit theas
give love to you hope you are
quite well Elizabeth Melba
My dear Sister Amelia
hope you are quite well

This image shows a blank, aged, cream-colored page, likely an endpaper or flyleaf from an old book. The paper has a slightly textured appearance with some minor discoloration and faint, illegible markings, possibly ink bleed-through from the reverse side. A dark vertical line is visible along the right edge, suggesting the binding or the edge of the book block.



